

Coping With Polluted Runoff: How Water Quality Is Affected by Land Use

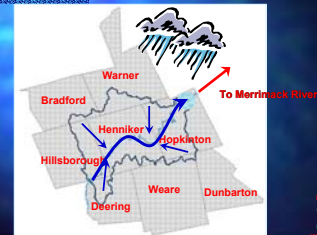


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Concepts We'll Cover in This Section...

- Population in the communities in the Henniker Tributaries Watershed of the Contoocook River is growing
- Increasing population requires additional housing
- New development creates additional caps to water infiltration
- Water that doesn't soak in runs off over land
- Runoff picks up pollutants from various sources
- Polluted runoff enters our waterways and degrades both wildlife habitat and human quality of life

The Henniker Tributaries Watershed

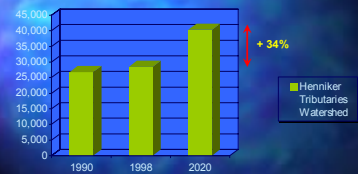


Population Growth in New Hampshire

- New Hampshire is the fastest growing state in New England (6.8%/year)
- OSP projects that the state's population will triple from 500,000 to 1.5 million in just 70 years (1950-2020)
- Population in the Henniker Tributaries Watershed communities is projected to increase by 34% in the period from 1990-2020

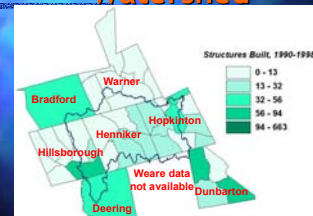
Source: New Hampshire's Changing Landscape, Society for the Protection of New Hampshire Forests and The Nature Conservancy, 1999

The Population in the Henniker Tributaries Watershed Communities...



Source: New Hampshire's Changing Landscape, Society for the Protection of New Hampshire Forests and The Nature Conservancy, 1999

Development Trends in the Watershed



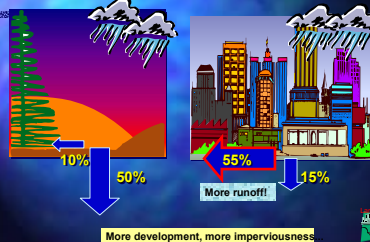
Source: 1999 CWRPC Development Trends Study

New residents need a place to live, so new subdivisions like these are springing up...



Result:
• Increased land use intensity
• More impervious caps

Imperviousness and runoff correlate...



As water runs off over the land, it picks up pollutants (like this engine oil) that were placed there by you, me, and everyone.

Other pollutants include:
• Nutrients (phosphorus, nitrogen)
• Sediment
• Pathogens and bacteria
• Toxics, e.g.: pesticides, road salt
• Organics: grass clippings, leaves

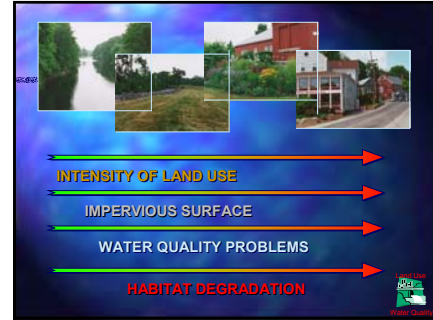
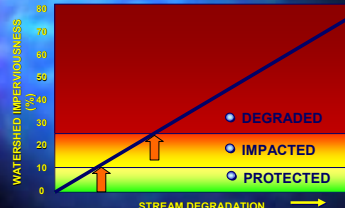
Nonpoint Source Pollution

Nonpoint Source Pollution

- That which cannot be traced back to any particular source
- The accumulated pollution from our everyday activities
- Effects are magnified by impervious surfaces
- The greatest threat to our waterways today
- Habitat degradation resulting from Nonpoint Source Pollution decreases human quality of life



This is bad news for water quality...

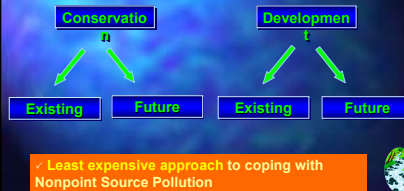


How Can We Cope With Nonpoint Source Pollution?

- Three strategies:
 - **Plan:** Natural Resources-Based Planning
 - **Minimize:** Site Design
 - **Minimize:** Best Management Practices



Plan: Natural Resources-Based Planning



Natural Resources-Based Planning



Natural Resources-Based Planning



Natural Resources-Based Planning



Natural Resources-Based Planning



Minimize: Site Design



✓ Chance for local officials, designers, and builders to work together to reduce Nonpoint Source Pollution

Basics of Site Design

- Reduce the amount of impervious areas
- Encourage the use of Innovative Land Use Controls
- Retain natural characteristics

All of these can be addressed through your zoning regulations!

Imperviousness Is Associated With...

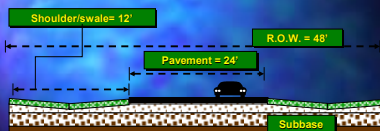


Road Tips...



Build roads only as wide as they need to be to effectively handle traffic.

Road Tips...



The entire right-of-way does not need to be paved.

Road Tips...

MYTHS ABOUT CURBS

- They promote pedestrian safety
- They protect the integrity of the street edge

FACTS ABOUT CURBS

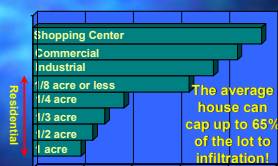
- They collect & convey road runoff
- They cost money
- They must be maintained

Curb Alternative: Engineered Swales

- Effectively collect and remove sediment and pollutants from runoff
- Promote infiltration
- Open, above-ground systems are easier to maintain

Swale: \$10-25/linear foot
Traditional Drainage: \$150-250/linear foot

Roofs and Imperviousness...



The average house can cap up to 65% of the lot to infiltration!

After University of Connecticut Cooperative Extension, 1999

Roof Runoff



- Redirect down spouts to pervious areas
- Rain gardens
- Rain barrels

Driveways...

Are we overdoing it?

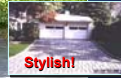


- Design shorter and narrower drives
- Design wide turnaround areas only where needed
- Design drives to follow contours
- Drain to pervious areas

Alternative: Pervious Paving Materials



Allow water to infiltrate!



Parking Lots... Zoning determines parking:

Zoning often requires almost twice the number of stalls actually used in peak periods

Don't zone for the day after Thanksgiving!



If Large Parking Lots Are Mandatory...

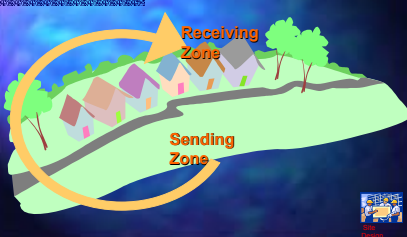


Innovative Land Use Controls

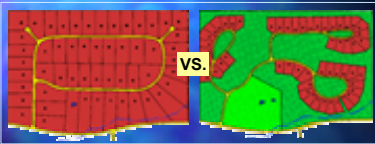
Useful Land Use Controls for controlling growth, maintaining open space, or protecting wetlands and aquifers include...

- Transfer of Development Rights (TDRs)
- Open Space Developments
- Planned Unit Developments (PUDs)
- Performance Standards/Impact Zoning
- Environmental Characteristics Zoning

Transfer of Development Rights



Open Space Developments



- Same number of housing units
- 10-50% less impervious surface
- Up to 50% open space
- Water resources protected

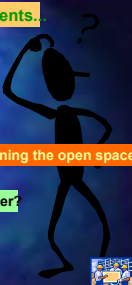
FAQs about Open Space Developments:

Won't they increase density?

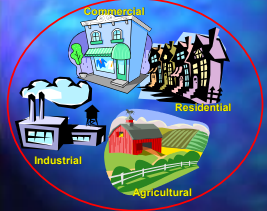
Who's going to be responsible for maintaining the open space?

How do they protect rural character?

Aren't they just disguised condo units?



Planned Unit Developments



Integrates a variety of land uses within the same development proposal.

Performance Standards/ Impact Zoning

Establishes standards that must be met by a development

Addresses the effects of a use rather than the use itself

Can be tailored to address imperviousness and runoff

"C. Maximum impervious surface shall be 5%, including buildings, roads, driveways, parking areas, patios, and other similar surfaces. To the extent possible, grassed overflow parking areas shall be encouraged."

Coastal Protection Zone Ordinance, Brunswick, Maine.

Environmental Characteristics Zoning


Asks the following questions:

- Which natural resources are important?
- What are the potential impacts of development on these resources?
- To what extent is change acceptable?

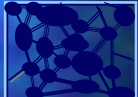
Techniques:

- Overlay zoning (for well-defined natural resources)
- Decision made on priorities based on an Open Space Plan or Community Profile

The "Big Picture" Message of the Preceding...



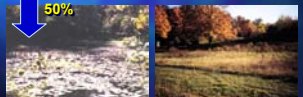
High imperviousness in central areas...



... but overall lower imperviousness than with unregulated development.

Retain Natural Characteristics

The goal of site design is to accommodate growth while protecting the natural landscape...
...by promoting infiltration!


Mitigate: Best Management Practices

- Overall objectives:
 - Prevent stormwater runoff
 - Education on effects of Nonpoint Source Pollution
 - Nonstructural/procedural BMPs
 - Break up flow of polluted runoff
 - Grass swales, vegetated buffer strips, etc.
 - Slow stormwater runoff
 - Detention/retention basins

Education Is a BMP


Support educational programs

- Schools
- Residents
- Town staff & crews
- Town officials




Support special activities

- Stormdrain stenciling
- Clean up days
- Other resource protection events



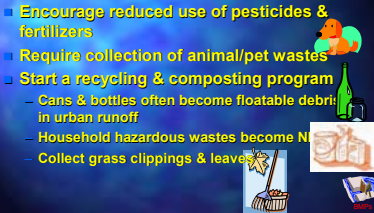
Municipal Standard Operating Procedures



- Sweep streets to collect sand in spring
- Restrict winter road salting in sensitive areas, or use alternatives to salt

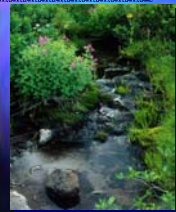
Residential BMPs

- Encourage reduced use of pesticides & fertilizers
- Require collection of animal/pet wastes
- Start a recycling & composting program
 - Cans & bottles often become floatable debris in urban runoff
 - Household hazardous wastes become N
 - Collect grass clippings & leaves



Vegetated Buffers

- Recognize the importance of riparian and wetland buffers
- Buffers are the first line of defense against the impacts that result from impervious surfaces
- Natural vegetation buffers are especially important in built-up areas



Buffers Break up the Flow...

Restore filtering capacity near construction or problem areas with a substitute buffer.



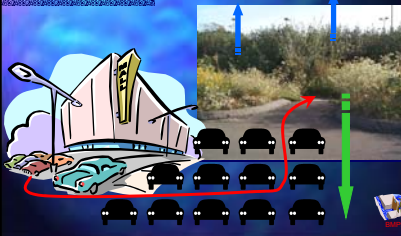
Retention Ponds

Runoff from parking lot

Natural infiltration - pollutants filtered by soil



Constructed Wetland



To Recap...

- There are many ways to manage polluted runoff:
 - **Plan:** identify water resources and where development should not go
 - **Minimize:** use site design to promote natural infiltration of water and reduce runoff
 - **Mitigate:** use BMPs to reduce the impact of polluted runoff



Coordinated Approach to Managing Polluted Runoff

- **Communication**
Everybody knows everyone else's role
- **Legal Requirements**
Town ordinances in line with State/Federal regulations
- **Focus**
Identify and protect most important water resources
- **Financing**
Local funds for local projects



Technical Resources

- New Hampshire Office of State Planning
www.state.nh.us/osp/ospweb.htm
- Central New Hampshire Regional Planning Commission
www.cnhrpc.org
- New Hampshire Department of Environmental Services
www.des.state.nh.us/
- University of New Hampshire Cooperative Extension
ceinfo.unh.edu

Questions?